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TEXAS UTILITIES GENERATING COMPANY

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January 28, 1985

Director of Nuclear Reactor Regulation
Attention: Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION
DOCKET NOS. 50-445 AND 50-446
RESPONSE TO NRC STAFF INTERIM
EVALUATION ON ACCIDENT MONITORING

REF: (1) B. J. Youngblood to M. D. Spence letter of November 15, 1984, entitled, "NRC Staff Interim Evaluation Report Concerning Comanche Peak Steam Electric Station Emergency Response Capability Conformance with Regulatory Guide 1.97, Rev. 2"

Dear Sir:

Reference (1) provided an interim evaluation by the NRC staff on the compliance of the Comanche Peak Steam Electric Station (CPSES) design with the guidance provided in Regulatory Guide 1.97, Rev. 2. The CPSES design has been reconsidered in light of this NRC Staff interim evaluation. In the attached response, additional information has been provided to better justify the acceptability of the CPSES design for several of the Accident Monitoring parameters.

As part of this response, a commitment has been provided to modify the CPSES design with respect to three parameters (SI Accumulator Pressure, Pressurizer Heater Status, and Containment Atmosphere Temperature). These backfits will be completed prior to startup for the second operating cycle for CPSES Unit 1 or as agreed upon with the NRC staff in a living schedule for CPSES Unit 1.

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The additional information and the backfit commitments provided in the attached response are intended to provide the input needed by the NRC staff to accept the CPSES Accident Monitoring design. The CPSES FSAR will be updated in an upcoming amendment to reflect these changes.

Respectfully,

John W. Beck

DRW:grr
Attachment

Distribution: Original plus 40 copies

ATTACHMENT TO TXX-4382

TUGCO RESPONSE TO THE NRC STAFF INTERIM EVALUATION REPORT CONCERNING CPSES CONFORMANCE TO REG. GUIDE 1.97 REV. 2

Reference: NRR letter of November 15, 1984

A response to the NRC Staff's interim evaluation of the Accident Monitoring design for the Comanche Peak Steam Electric Station (reference 1) is provided below. This response is intended to significantly advance the efforts to resolve this issue. The paragraphs below are numbered the same as the corresponding sections in the interim evaluation to allow for easy identification.

1. The NRC Staff evaluation was performed through amendment 45 of the CPSES FSAR. An additional deviation from Reg. Guide 1.97 Rev. 2 was added to the CPSES FSAR by amendment 52. This deviation involves the range used to measure Atmospheric Stability. CPSES uses a range from -5°F to +5°F while Reg. Guide 1.97 Rev. 2 recommends a range of -5°C to +10°C.

This deviation is justified because the CPSES range of -5°F to +5°F which respresents the difference in temperature between the 10 meter and the 60 meter levels on the primary meteorological tower is equivalent to -2.78°C to +2.78°C for a 50 meter span or -5.56°C to +5.56°C for an equivalent 100 meter span. The -5.56°C lower limit is less than the -1.9°C limit that defines an extremely unstable atmosphere (Pasquill category A) and the upper limit of +5.56°C is greater than the +4°C that defines an extremely stable atmosphere (Pasquill category G). Therefore, the CPSES range envelopes the atmospheric stability ranges specified in Table 1 of the proposed revision 1 of USNRC Regulatory Guide 1.23, "Meteorological Programs in Support of Nuclear Power Plants."

3.1 TUGCO has performed an analysis to determine the vaiables that are needed for Accident Monitoring at CPSES and to determine the design criteria needed for these variables. This analysis and the Accident Monitoring design at CPSES meets the intent of Reg. Guide 1.97 Rev. 2.

TUGCO has performed a detailed comparison between the CPSES Accident Monitoring design and Reg. Guide 1.97 Rev. 2. The CPSES design complies with the guidance of Reg. Guide 1.97 Rev. 2 except as noted in our response to NRC question 032.110, as provided in the CPSES FSAR.

3.2 The list of Type A variables at CPSES is provided in Table 7.5-2 of the CPSES FSAR. The list in the interim evaluation omitted Narrow Range Steam Generator Level and Steam Generator Blowdown Radiation.

The following variables were listed as Type A by Table 7.5-2 but are no longer Type A:

RCS Subcooling,
Condenser Off-gas Radiation,
Main Steamline Radiation, and
Steam Generator Blowdown Radiation.

The CPSES design included Type A backup variables in a manner consistent with the discussion of key and backup variables in section B of Reg. Guide 1.97 Rev. 2. These backup variables were assigned category 2 by the CPSES design. The NRC staff does not recognize Type A backup variable and requires that all Type A variables be category 1. Therefore, the four Type A backup variables listed above have been removed from the Type A list.

3.3.1.1 <u>Neutron Flux Range</u>

The interim evaluation found that the range provided by the CPSES design is not acceptable because it does not cover the range of 50% to 100% of rated power and the NRC Staff requires that neutron flux be indicated through 100%.

In order to comply with this requirement, the CPSES Accident Monitoring design will be changed to include the Power Range Neutron Flux channels under the variable Neutron Flux (a type B, category 1 variable). The Power Range Neutron Flux channels comply with the category 1 requirements of the CPSES design (see the CPSES FSAR Chapter 7.5 and the response to NRC staff

question 032.110) except that the channels are not environmentally qualified to the post accident environment inside containment following a design basis accident. This deviation is acceptable because power level will be in the power range for a very short period of time during those design basis accidents that result in a harsh environment inside containment.

3.3.1.2 Neutron Flux Environmental Qualification

The variable, Neutron Flux, is a category 1 variable by the CPSES Accident Monitoring analysis and the guidance provided by Reg. Guide 1.97 Rev. 2. The difficult and expensive backfit of upgrading the Source and Intermediate Range Neutron Flux Channels to category 1 requirements is not justified, however.

Neutron Flux was selected as the key Type B variable that provides the most direct indication of Reactivity Control. Of course, this variable actually indicates neutron flux and not reactivity. Neutron Flux is a dynamic variable that depends on several variables altnough the trend of neutron flux is primarily controlled by reactivity. The CPSES Accident Monitoring design includes four backup variables for the type B function of Reactivity Control. These backup variables are RCS Hot Leg Temperature (Th), RCS Cold Leg Temperature (Tc), Control Rod Position, and RCS Soluable Boron Concentration. These four variables, when taken together, provide a clear indication of the shutdown status of the core. The variables allow for the indication of changes in heat generation as well as changes in the main parameters that contribute to reactor reactivity. Knowledge of control rod position, boron concentration and RCS temperature determines actual reactor reactivity fairly precisely. In the long term, these backup variables are the most accurate indication of reactivity.

Because full, proper and accurate indication is provided by these backup variables and because of the magnitude of the backfit to upgrade the Source and Intermediate Neutron Flux channels to category 1, the CPSES design is acceptable as is and upgrading should not be required by the NRC Staff.

With NRC Staff agreement that the CPSES design is technically adequate for Accident Monitoring, the concerns over 10 CFR 50.49 are no longer applicable.

3.3.2 RCS Soluable Boron Concentration

NUREG-0737, Item II.B.3 was closed out by CPSES SSER #6 (NUREG-0797), Section 22.2, where the NRC staff concluded that the proposed post-accident sampling system at CPSES meets all of the criteria of Item II.B.3 of NUREG-0737 and is, therefore, acceptable. The CPSES design for the variable RCS Soluable Boron Concentration should be accepted based on this NUREG-0737, Item II.B.3 review.

3.3.4 Coolant Level in Reactor

NUREG-0737, Item II.F.2 was closed out by CPSES SSER #6 (NUREG-0797), Section 22.2, where the NRC staff concluded that the ICC detection system at CPSES is in conformance with these requirements and that the implementation schedule is acceptable (with a license condition that the system to measure coolant level in the reactor be installed prior to startup for the second operating cycle) and, therefore, considers this issue resolved. The CPSES design for the variable "Coolant Level in Reactor" should be accepted based on this NUREG-0737, Item II.F.2 review.

3.3.5 Degrees of Subcooling

This variable has been deleted from the list of Type A variables as discussed under 3.2 above. Therefore category 2 should now be acceptable.

The CPSES design for Degrees of Subcooling should also be acceptable based on the NUREG-0737, Item II.F.2 review as discussed above under 3.3.4.

3.3.8 Containment Pressure

This paragraph should be numbered 3.3.7.

3.3.12 Accumulator Tank Level and Pressure

In evaluating the Type D variables needed to provide indication of the operation of the Emergency Core Cooling Systems, certain variables were found to be key variables (RWST Level, Safety Injection Flow, RHR Flow, Charging Pump Injection Flow, Containment Water Level, ECCS Valve Status and SI Accumulator Isolation Valve Status). In addition, this evaluation concluded that SI Accumulator Tank Level and Pressure were good backup variables. As Type D backup variables, both Reg. Guide 1.97 Rev. 2 and the CPSES analysis specify that these variables should be category 3.

The NRC staff requires that either SI Accumulator Tank Pressure or Level be a category 2, key variable. In order to comply with this requirement, the CPSES design will be changed such that SI Accumulator Tank Pressure will become a Type D key variable (category 2) while SI Accumulator Tank Level will remain a Type D backup variable (category 3). This backfit will be completed prior to startup for the second operating cycle for CPSES Unit 1 or as agreed upon with the NRC staff in a living schedule for CPSES Unit 1.

3.3.14 Pressurizer Heater Status

In performing the Accident Monitoring analysis for CPSES, the key Type D variables for Pressurizer Level and Pressure Control were: PORV Status, Safety Valve Status, Pressurizer Level and RCS Pressure (WR). These variables provide the most direct indication of the operation of the Pressurizer Level and Pressure Control systems. In addition, Pressurizer Heater Breaker Position was chosen as a backup variable. Knowing that a pressurizer heater breaker is closed and that the power supply is available provides good evidence that the heaters are functioning. Knowing that the heaters are functioning is good backup information to RCS Pressure (WR) and potential diagnoistic information. The proper category for this variable is category 3.

Reg. Guide 1.97 Rev. 2 calls for using the electric current to the pressurizer heaters as the monitored variable instead of breaker position. Breaker position was available in the CPSES design while heater current was

not. The only apparent advantage to using current was that if there was a failure of some of the heaters, the operator might be able to evaluate what portion of the heaters were still operable. The accuracy of such an evaluation would be highly questionable an maybe even misleading. In a scenario where some of the heaters failed but the supply breaker did not trip, there is also a chance that high resistance faults could develope such that the circuit would draw current but not heat the coolant in the pressurizer. As a result of this type of logic, engineers performing the Accident Monitoring analysis for CPSES concluded that Pressurizer Heater Breaker Position was the correct variable for CPSES and that backfitting heater current channels was not technically required nor justified.

The NRC staff requires that the CPSES design includes electric current as category 2 Accident Monitoring parameters for those heaters required by the CPSES draft technical specification. In order to comply with this requirement, the CPSES design will be changed to add Pressurizer Heater Electric Current for each heater group as a Type D key variable (category 2). This backfit will be completed prior to startup for the second operating cycle for CPSES Unit 1 or as agreed upon with the NRC staff in a living schedule for CPSES Unit 1.

3.3.16 Steam Generator Pressure

The variable at CPSES that provides information relative to steam generator pressure is Main Steamline Pressure. Main Steamline Pressure is sensed off the steamline just after it exists the steam generator, downstream of the steam flow restrictors and upstream of the Main Steam Isolation Valves. This means that the pressure sensed by this variable is very close to the same pressure seen by the Main Steam Safety Valves.

The Main Steam Safety Valves have different setting but per the final draft of the CPSES Technical Specifications, the highest setting is 1235 psig $\pm 1\%$. The accumulation associated with these valves is 3%. That means that all the safety valves will be wide open at a pressure slightly less than 1285 psig. Based on this analysis, the range of 0 to 1300 psig is adequate for the Main Steamline Pressure variable.

3.3.17 Containment Atmosphere Temperature

Per the containment analysis in Section 6.2 of the CPSES FSAR, the peak vapor temperature inside containment does not exceed 270°F except for certain main steamline break (SLB) accident scenarios. In the most severe SLB, the graph of temperature versus time shows that vapor temperature will exceed 300°F at about 50 to 60 seconds into the accident, the peak of 334°F will be reached about 90 seconds into the accident and that vapor temperature will fall below 300°F at about 120 to 130 seconds into the accident. In other words, this is a rapid temperature transient that could exceed 300°F for about one minute. The operator would probably not see this transient if it were displayed. And even if the operator did see the peak, all operations are automatic and the operator does not have the time or the systems available to take any benefical manual action in response to the peak.

Texas Utilities has reconsidered the range of this parameter based on the comments from the NRC Staff and the impact of the backfit. The CPSES design will be changed such that the range for Containment Atmosphere Temperature will be from 40°F to 400°F to be in full compliance with Regulatory Guide 1.97, Rev. 2 and to envelope all the transients at CPSES. The backfit will be completed prior to startup for the second operating cycle for CPSES Unit 1 or as agreed upon with the NRC staff in a living schedule for CPSES Unit 1.

3.3.18 Containment Sump Water Temperature

Where the CPSES Accident Monitoring analysis was performed, Containment Sump Water Temperature was not selected as either a key or a backup variable for any of the functions, systems or potential events being monitored. TUGCO concluded that Containment Sump Water Temperature should not be an Accident Monitoring variable for CPSES.

The precise basis for the inclusion of this variable in Reg. Guide 1.97, Rev. 2, is not explicitly defined but it is possible that some plants may need to monitor this variable because of problems with the net positive

suction head (NPSH) being provided for the ECCS pumps under certain accident conditions. A very conservative analysis of the NPSH for ECCS pumps at CPSES was performed. This analysis is described in the CPSES FSAR in Section 6.3.2.2.10, Table 6.3-1, Figure 6.3-2 and the response to question 212.43. The conclusion of this analysis is that adequate NPSH is always provided to the ECCS pump in all modes (including recirculation when these pumps take suction on the containment sump) and using conservative assumptions. In other words, the NPSH provided to the ECCS pumps has been shown to always be adequate at CPSES because of the system designs. Monitoring containment sump water temperature will not be useful to the operator and may indeed be harmful (since it may take some of the operators time when he has more important actions or variables to be concerned with).

3.3.21 Condenser Air Removal System Exhaust - Noble Gas and Vent Flow Rates

As discussed under section 3.2 above, the CPSES analysis no longer designates this variable as Type A. Therefore, category 2 is correct and should be acceptable to the NRC Staff.

The deviation list in the CPSES submittal for Condenser Off-gas Radiation was that the CPSES range was 10^{-5} to 10^{-1} μCi/cc while Reg. Guide 1.97, Rev. 2, under Type C variables, recommends a range of 10^{-6} to 10^{-2} μCi/cc. The CPSES evaluation found 10^{-5} to 10^{-1} μCi/cc to be an adequate range for CPSES and since this range covers a full four decades it should be acceptable to the NRC staff on this basis, even though the absolute limits of the range differ by one decade.

In the interim evaluation, the NRC staff compared the CPSES range for this varible to the range provide in Reg. Guide 1.97 Rev. 2 for Condenser Air Removal System Exhaust when used as a Type E variable. CPSES does not use Condenser Off-gas Radiation as a Type E variable. At CPSES, the off-gas from the condensers passes through the common plant vent and, in such designs, Reg. Guide 1.97 Rev. 2 allows that the detectors for the common plant vent can be used to satisfy the Type E requirements established by the regulatory guide. The CPSES design uses these common plant vent

detectors (range, 10^{-6} to 10^{5} μCi/cc) to meet the Reg. Guide 1.97 Rev. 2 Type E guidance.

3.3.22 Main Steamline Radiation

As discussion in section 3.2 above, this variable is no longer Type A at CPSES and, therefore, category 2 should be acceptable.

3.3.24 Accident Sampling (Primary Coolant, Containment Air and Sump)

As described in section 3.3.2, the NRC Staff has accepted the CPSES design with respect to NUREG-0737, Item II.B.3. The CPSES Accident Monitoring design for the variables associated with Accident Sampling should be accepted based on this NUREG-0737, Item II.B.3 review.